

Short Papers and Notes

OCCURRENCE OF IMMATURE KEMP'S RIDLEY TURTLES, *Lepidochelys kemp*, IN COASTAL WATERS OF NORTHWEST FLORIDA

Kemp's ridley turtle (*Lepidochelys kemp*) is considered the most endangered species of sea turtle. Efforts to restore its populations are hindered in part by lack of information on the species in developmental and foraging habitats where they spend most of their lives. Overall knowledge of the species was summarized by Pritchard and Marquez (1973) and again by Marquez (1984) who also provided a complete review of the literature through 1983. Owens, Clavell, Dienberg, Grassman, McCain, Morris, Schwantes and Wibbels (1983) summarized conservation efforts for Atlantic Ridleys. Henwood and Ogren (1987) and Ogren (1989) examined seasonal distribution, size and movement patterns of Kemp's ridley and green turtles (*Chelonia mydas*) in the coastal waters of the southeastern United States and found, with a few exceptions, only subadult animals.

Only limited information has been available for Kemp's ridley on the Gulf coast. Carr and Caldwell (1956) measured 96 ridleys and tagged 25 taken in the commercial turtle fishery that existed south of Cedar Key, Florida. Liner (1954) and Dobie, Ogren and Fitzpatrick (1961) reported on 11 ridleys taken from Louisiana waters by shrimp trawlers, and Carr, Ogren and McVea (1982) and Ogren and McVea (1982) noted fishermen's reports of overwintering, hibernating turtles but lacked data to substantiate those reports. Fuller, Tappan and Hester (1987), reporting fishermen's sightings, indicated that in Louisiana turtles are present year-round in coastal waters. Rabalais and Rabalais (1980) found both adult and subadult ridleys on the Texas coast in a study of

turtle strandings. Schroeder and Warner (1988) and Teas and Martinez (1989) report on strandings of turtles on the Atlantic and Gulf coasts of the United States by species, state and month of the year. These Sea Turtle Stranding and Salvage Network (STSSN) records also include data on size, sex and probable cause of death (if indicated). Ogren (1989) summarized juvenile and subadult developmental habitat distribution and relative abundance of turtles in the northern Gulf of Mexico and the North Atlantic primarily from captures of live turtles.

In this paper, we report the results of a tagging project conducted from 1984-1988 in the coastal waters of Wakulla and Franklin counties, Florida, in the northeastern Gulf of Mexico, involving post-pelagic immature Kemp's ridley turtles.

MATERIALS AND METHODS

Fishermen in the study area brought in Kemp's ridleys taken incidentally during shrimp trawling, gill netting, and seine fishing for other species, under permits from the Florida Department of Natural Resources to Gulf Specimen Marine Laboratories. Turtles thus captured were placed in a 1000 liter tank containing recirculating seawater and held under observation for an average of seven days. Durations of captivity ranged from less than one to 32 days depending on inshore water temperatures and staff evaluation of the condition of the turtle. Turtles were fed live blue crabs, *Callinectes sapidus*, while being held in the tank. Information was obtained from the fishermen concerning locality, depth, bottom type and gear use at the time of capture. The turtles were double tagged immediately prior to release with inconel flipper tags (National Bank & Tag Company, style 681) provided by the National Marine Fisheries Service. Straight line carapace length and width, plastron length and weight were

measured. The animals were photographed after tagging and released into nearby Dickerson Bay for convenience since returning them to widely scattered offshore capture localities was not practical and because Dickerson Bay is routinely used by foraging ridleys.

RESULTS

A total of 106 Kemp's ridleys was taken during the study from June, 1984, through August, 1988. An additional 13 were collected from November, 1970 through May, 1984 but were not included in this analysis. The turtles were collected from 13 localities over a 60 mile stretch of coast from Shell Point, Wakulla County, to St. George Island, Franklin County, Florida (Fig. 1). Turtles were generally received in good condition; eight were weak upon capture and six recovered prior to release, while two died prior to release. Twenty-five had one or more turtle barnacles, *Chelonibia testudinaria*.

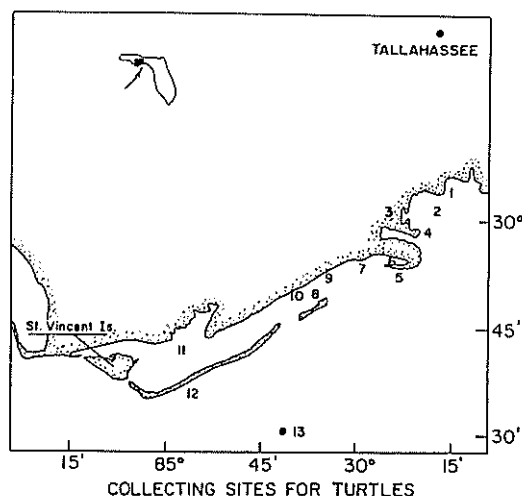


Figure 1. Localities from which turtles were collected and the number captured from each site: (1) Live Oak Island, 1; (2) Shell Point Reef, 13; (3) Panacea, 14; (4) Mashes Sands, 3; (5) Alligator Point, 15; (6) Alligator Harbor, 16; (7) Wilson Beach, 16; (8) Dig Island, 1; (9) Lanark, 1; (10) Carrabelle Bay, 6; (11) Apalachicola Bay, 1; (12) St. George Island, 10; (13) offshore sites, 9.

Turtles were taken in all months of the years with maximum numbers taken in May and December. The turtles ranged in size from 20.3 to 57.9 cm straight line carapace length (mean = 36.7 cm). Weights ranged from 635 g to 13.7 kg. All turtles were below the minimum size range of nesting females (ca. 60 cm CL) and were considered immature. No significant differences were found in size of turtles taken for any of the collection localities. Figure 2 provides length-frequency data for 102 turtles, omitting four for whom size was not recorded.

A comparison of sizes (CL) of turtles caught during the winter months of December, January, and February versus summer months of June, July, August and September indicated that turtles present during the winter ($n = 27$) were significantly larger than those taken during the summer ($n = 26$). The winter mean was 40.4 cm CL and the summer mean was 30.9 cm CL ($t = 3.9$, $P < 0.001$). To reduce the effect of gear bias, the data were reanalyzed using only trawl caught turtles with the four individuals captured offshore in the winter removed from the data set. A total of 18 winter captures and 14 summer captures were compared. The difference was still significant, with a summer mean of 32.9 cm CL and a winter mean of 40.6 cm CL ($t = 2.63$, $P < 0.05$, $n = 32$). Two turtles, both taken in March 1985 (51.6 cm CL and 33.3 cm CL), appeared to have overwintered and may have hibernated on the bottom. The posterior part of the carapaces were fouled with green algae and the barnacle, *Balanus amphitrite*.

Turtles were taken from sites with various types of substrates ranging from seagrass to sand or mud bottom. A total of 99 of the turtles collected had data on substrate type at the capture locality. Of these, 27 were taken off sea grass, 42 off sand and 30 off mud bottom. Analysis of variance indicated no significant prefer-

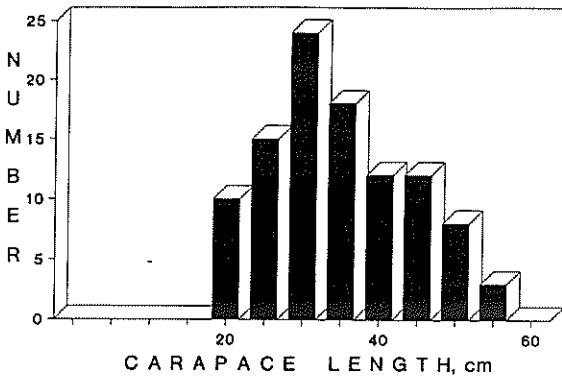


Figure 2. Length frequency of Kemp's ridley turtles captured in north Florida. All measurements are straight line carapace length (CL) along mid-line (N = 102; size data were lacking for 4 individuals).

ence for any of the three bottom types ($F = 0.53$, NS, $n = 99$). Depths in which turtles were taken ranged from 30 cm to 32 meters. Turtles taken from two meters or less ($n = 11$, mean = 30.2 cm CL) were significantly smaller (Newman-Keuls, gap difference 7.2, $P < 0.05$) than those taken from greater depths ($n = 67$, mean = 37.4 cm CL). Only three of the turtles captured in shallow water were taken by trawl; however, the rest were collected by either gill net or by hand or with a seine. Most of the turtles from deeper water were captured by shrimp trawls. Gear bias may be a factor, but the mean carapace length of those three turtles collected by trawls in shallow water was 27.0 cm, and they were smaller than those taken by trawling in greater depths. Four turtles were recaptured after being tagged and released within the same season and year. Three were taken within five miles of the release point after having returned to the original point of capture within 17 days of release. One originally captured approximately fifty miles from the release point was recaptured after six days within one mile of the release site. The time between captures was insufficient to provide any growth data.

In addition, four green turtles and five small loggerheads (*Caretta caretta*)

were tagged and released. The greens ranged in size from 26.9 cm CL to 98.0 cm CL. One was recaptured after two years within a mile of its original capture location and had grown from 34.0 cm CL to 42.7 cm CL despite the loss of the left rear flipper. The number of loggerheads captured was not indicative of their relative abundance because we did not request their collection by fishermen.

DISCUSSION

The northern coast of the Gulf of Mexico serves as a major foraging ground for juvenile and subadult Kemp's ridley, a species that feeds predominantly on crustaceans and to a lesser degree on other benthic invertebrates (Dobie *et al.* 1961; Marquez, 1984; Ogren 1989). In our study, turtles were found on all available bottom types and depths from a few centimeters to 32 meters six miles offshore, indicating their respective diving ability and habitat preference according to their size. The smallest turtles were taken from depths of less than two meters and were all immature. Brongersma (1972) reported that Kemp's ridleys in European waters were also immature individuals.

Peak numbers of individuals were collected in December and May, coincidentally with peak local shrimping effort. However, turtles were present in the study area in all months of the year, and offshore occurrences during winter months to depths greater than 30 m for three individuals were observed.

The significance of larger turtles in this area in winter than in summer is not apparent at this time. Tag recoveries indicate that they may remain in the area within a season which might reflect that maximum growth occurs during the summer. Based on estimates by Zug and Kalb (1989), our ridleys may be at least two years but less than seven years old, and of the size experiencing the most rapid

growth.

ACKNOWLEDGMENTS

We wish to thank the many commercial fishermen who participated in this research effort. Mary Ellen Chastain and Douglas Gleeson provided record keeping and tagging help. Funds were provided by the National Marine Fisheries Service. The Caribbean Conservation Corporation supported the tagging effort prior to 1984. We also wish to acknowledge the inspiration provided by the late Dr. Archie Carr in innumerable ways.

REFERENCES CITED

- Brongersma, L.D., 1972. European Atlantic turtles. Zoologische Verhandelingen. Rijksmuseum van Natuurlijke Historie te Leiden. 318p.
- Carr, A.F. and D.K. Caldwell, 1956. The ecology and migrations of sea turtles. I. Results of field work in Florida, 1955. Am Mus. Novitates 1793.
- Carr, A.F., L.H. Ogren, and C. McVea, 1982. Hibernation by the Atlantic loggerhead turtle *Caretta caretta* off Cape Canaveral, Florida. Bio. Cons. 19:7-14.
- Dobie, J.L., L.H. Ogren, and J.F. Fitzpatrick, 1961. Food notes and records of the Atlantic ridley turtle (*Lepidochelys kempi*) from Louisiana. Copeia 1961 (1):109-110.
- Fuller, D.A., A.M. Tappan, and M.C. Hester, 1987. Sea turtles in Louisiana's coastal waters. Louisiana Sea Grant, Center for Wetland Resources, Louisiana State University, Baton Rouge, La. Final Report, NMFS.
- Henwood, T.A. and L.H. Ogren, 1987. Distribution and migrations of immature Kemp's ridley turtles (*Lepidochelys kempi*) and green turtles (*Chelonia mydas*) off Florida, Georgia, and South Carolina. Northeast Gulf Science 9(2): 153-159.
- Liner, E.A., 1954. The herpetofauna of Lafayette, Terrebonne and Vermillion Parishes, Louisiana. Proc. La. Acad. Sci. 17:65-85.
- Marquez, R., 1984. Kemp's ridley turtle — Overview of biology, in Bacon, P., F. Berry, K. Bjorndal, H. Hirth, L. Ogren, and M. Weber. (eds.), Proceedings of the Western Atlantic Turtle Symposium, 17-22 July, 1983. RSMAS Printing, Univ. of Miami, Miami, Florida.
- Ogren, L.H. and C. McVea, 1982. Apparent hibernation by sea turtles in North American waters. pp. 127-132. In K.A. Bjorndal (ed.), Biology and conservation of sea turtles. Smithsonian Inst. Proc., Washington D.C.
- Ogren, L.H., 1989. Distribution of juvenile and subadult Kemp's ridley turtles: Preliminary results from 1984-1987 surveys. pp. 116-123. In Caillouet, C.W., Jr., and A.M. Landry, Jr. (eds.), Proceedings of the first international symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management. Texas A & M University Sea Grant College Program. TAMU-SG-89-105.
- Owens, D., D. Crowell, G. Dienberg, M. Grassman, S. McCain, Y. Morris, N. Schwantes and T. Wibbels (eds.), 1983. Western Gulf of Mexico Sea Turtle Workshop Proceedings. Texas A & M University. TAMU-SG-84-105.
- Pritchard, P.C.H. and R. Marquez, 1973. Kemp's ridley turtle or Atlantic turtle, *Lepidochelys kempi*. IUCN Monograph #2, Morges, Switzerland.
- Rabalais, S.C. and N.N. Rabalais, 1980. The occurrence of sea turtles on the south Texas coast. Contr. Mar. Sci. 23:123-129.
- Schroeder, B.A. and A.A. Warner, 1988. Sea turtle stranding and salvage network, Atlantic and Gulf coasts of the United States, January-December 1987. Coastal Resources Division, NMFS, Contrib. No. CRD-87/88-28.
- Teas, W.G. and A. Martinez. 1989. Sea

turtle stranding and salvage network, Atlantic and Gulf coasts of the United States, January-December 1988. Coastal Resources Division, NMFS, Contrib. No. CRD-88/89-19.

Zug, G.R. and H.J. Kalb, 1989. Skeleto-chronological age estimates for juvenile *Lepidochelys kempi* from the Atlantic coast of north America. Ninth Annual Workshop on Sea Turtle Conservation and Biology. February 7-11, 1989, Jekyll Island, Georgia. (abstract).

Anne and Jack Rudloe, Gulf Specimen Marine Laboratories, P. O. Box 237, Panama City, Florida 32346

Larry Ogren, National Marine Fisheries Service, 3500 Delwood Beach Road, Panama City, Florida 32408